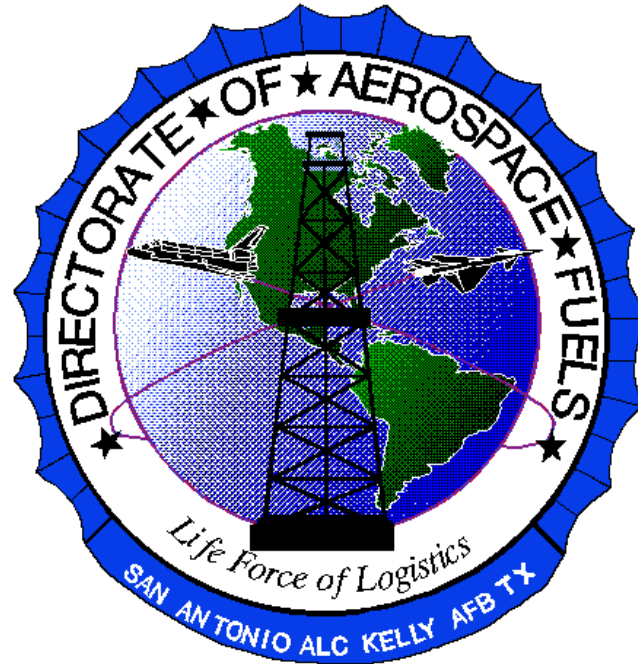




JP-8+100 IMPLEMENTATION



TECH ASSISTANCE TEAM

DIRECTORATE OF AEROSPACE FUELS

KELLY AFB TX DSN 945- 4617



PURPOSE

- **PROVIDE JP-8+100 INFORMATION**
 - **WHAT IS JP-8+100?**
 - **WHY IS IT NEEDED?**
 - **WHAT ARE THE BENEFITS?**
 - **WHAT ARE THE CHALLENGES?**
 - **HOW IS IT IMPLEMENTED?**



WHAT IS JP-8+100?

25 PPM	ANTIOXIDANT	INHIBITS FORMATION OF INSOLUBLES
70 PPM	DISPERSANT	KEEPS DEGRADATIVE PRODUCTS IN SOLUTION
	DETERGENT	SCRUBS DEGRADED PRODUCTS FROM ENGINE
	(SURFACTANT)	
3PPM	MDA	TAKE UP TRACE METALS IN FUEL THAT SPEED UP CHEMICAL REACTIONS WHICH FORM DEGRADED PRODUCTS (GUMS, VARNISH, COKE)
158 PPM	SOLVENT	PREVENTS CRYSTALLIZATION & MAKES ADDITIVE MORE SOLUBLE IN JP-8

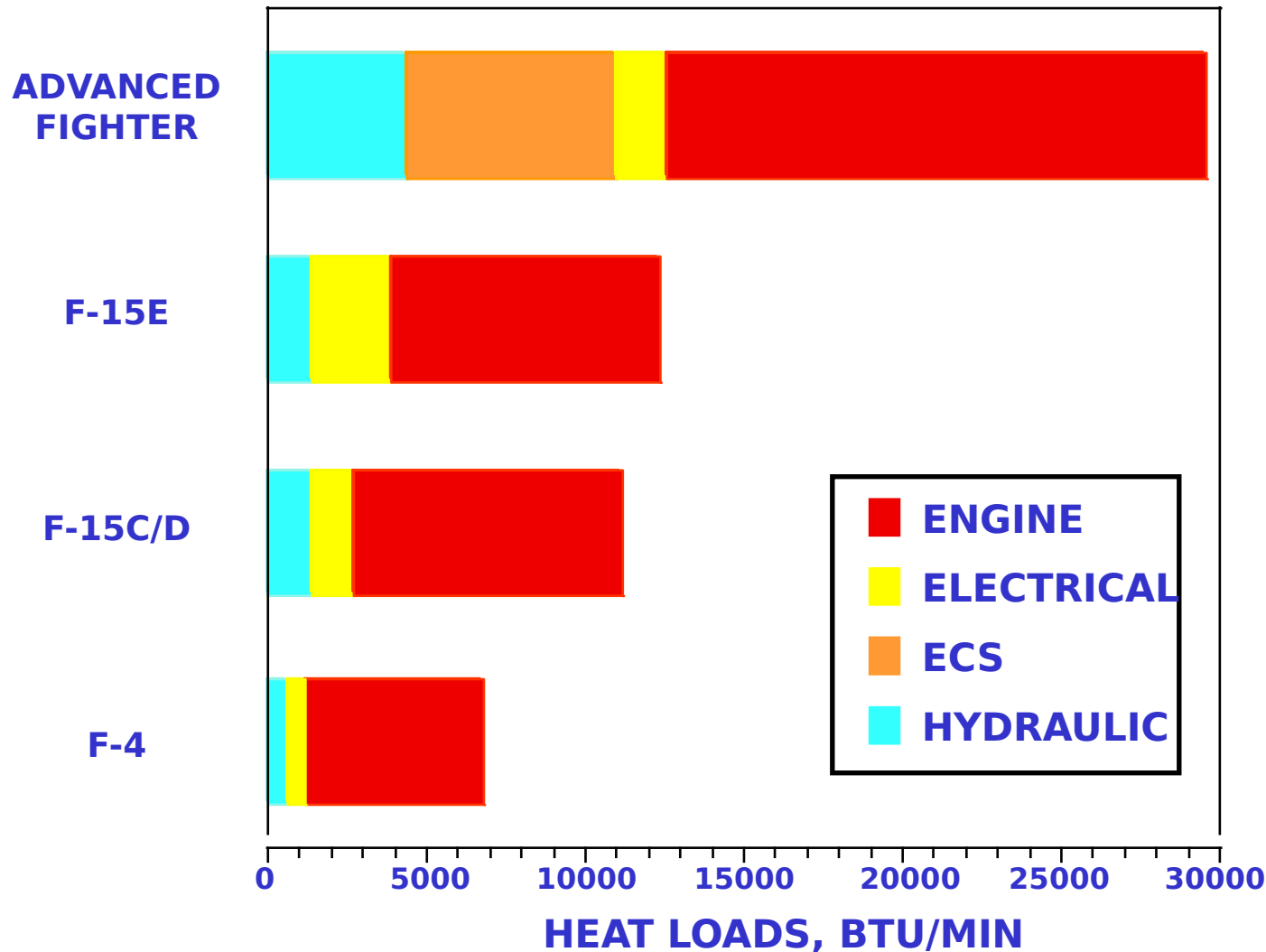


WHY JP-8+100 ?

- **ADVANCED AIRCRAFT NEED IMPROVED THERMAL MARGIN**
- **SPECIAL FUELS (JPTS, JP-7) TOO EXPENSIVE**
- **REDUCED MAINTENANCE COSTS**
- **COMPATIBLE WITH CURRENT & FUTURE AIRCRAFT**



AIRCRAFT HEAT LOADS FUEL COOLING REQUIREMENT

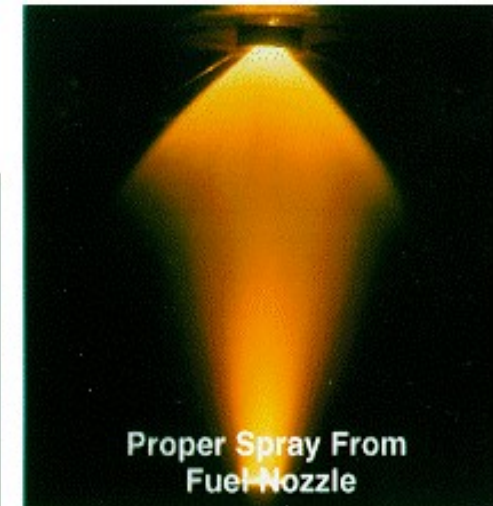




T38 (GE J-85) FUEL NOZZLE COKING



Fuel Nozzle Face Covered With Coke and Soot



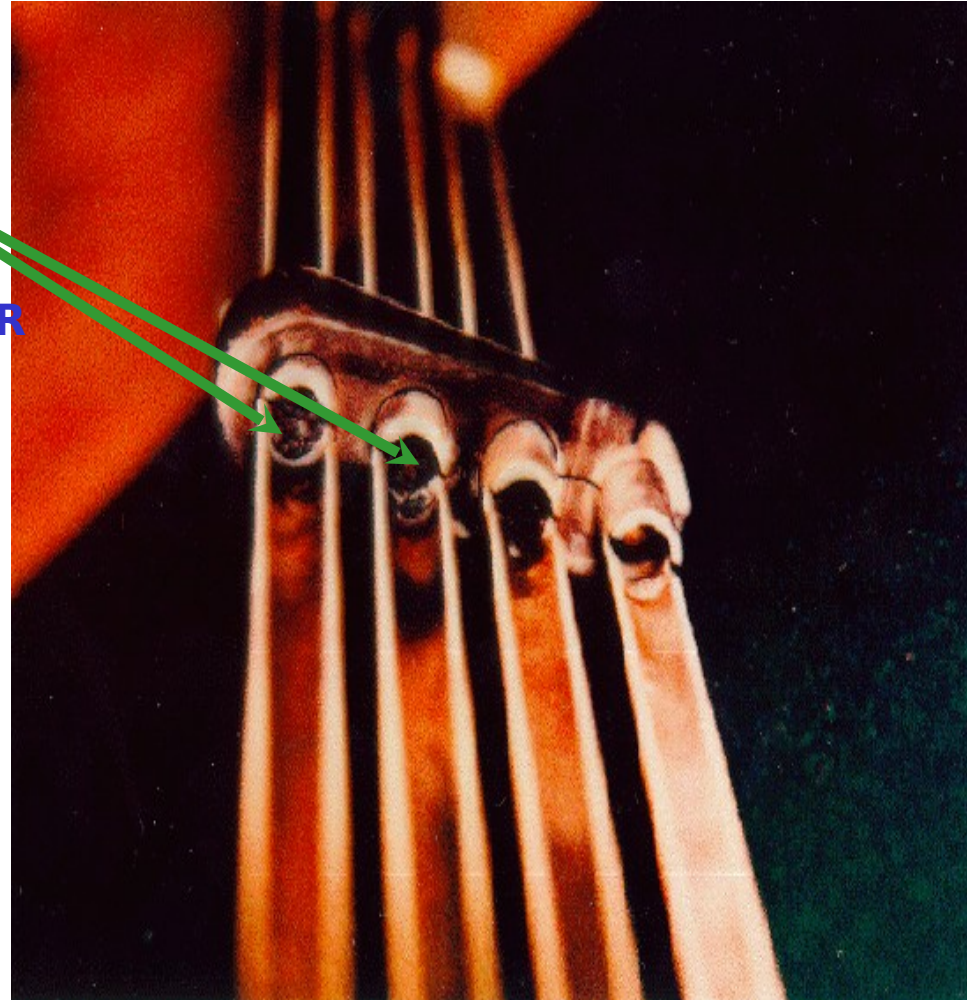
- Coking/Fouling/Sooting Distorts Spray
- Causes Engine Hot Streaks and Damage
- Contributes to High Cycle Fatigue



B1-B AUGMENTOR COKING

PLUGGED SPRAYBAR PASSAGES

- **FOULING DISTORTS AUGMENTOR SPRAY PATTERN**
- **DISTORTED SPRAY CAUSED COMBUSTION INSTABILITY CALLED RUMBLE**
- **RUMBLE CAN DAMAGE ENGINE**
- **CURRENTLY A MAINTENANCE BURDEN AT OC-ALC**

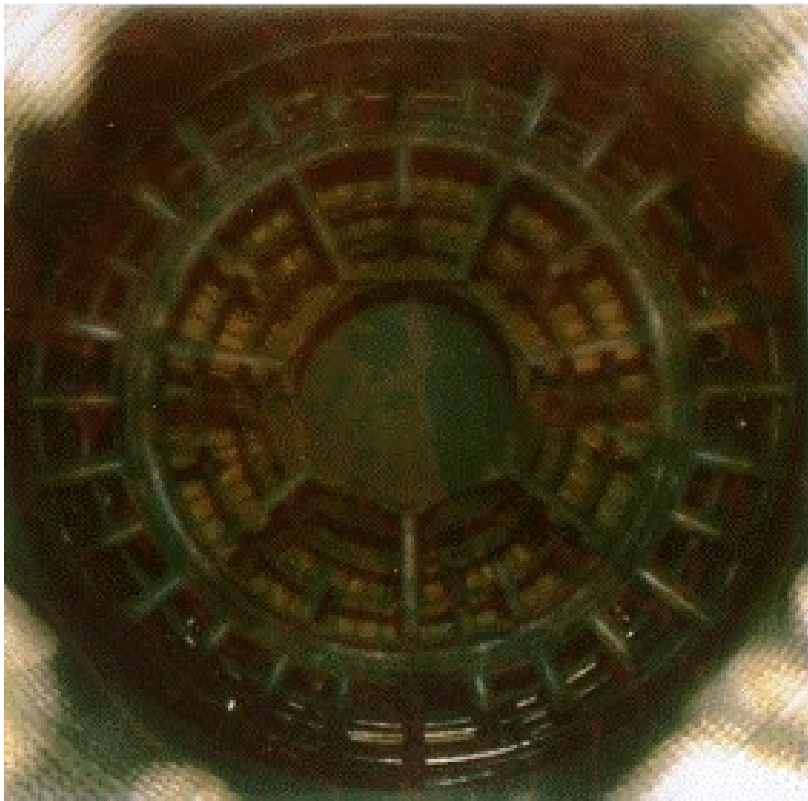




JP-8 +100 DEMONSTRATION KINGSLEY, OR (F16/F100-200)



- 200+ Hours on JP-8



- 200+ Hours on JP-8
then
56 Hours on JP-8+100



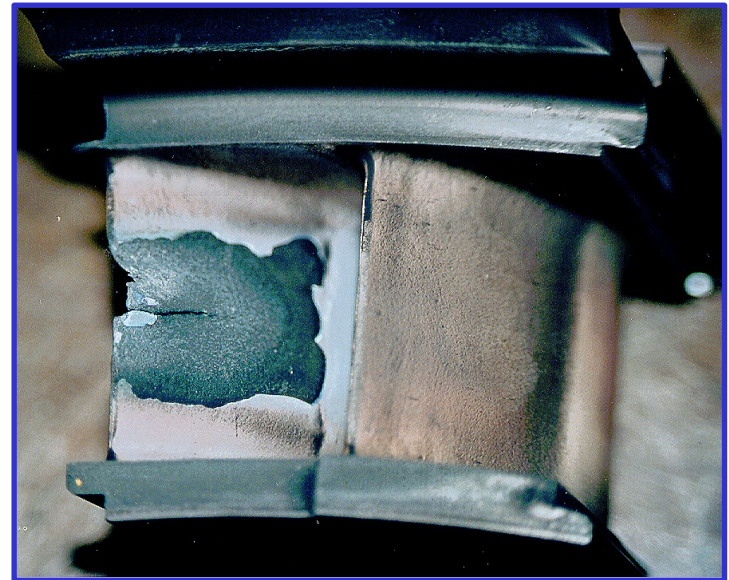


C-130 (T-56) Typical Coking Problems



**Plugged Mainburner
Fuel Nozzle**

**DUE TO TURBINE BLADE
DAMAGE NASHVILLE
PLACED ON JP-8+100**



**Contributes to Turbine
Vane Damage**



WHAT ARE THE BENEFITS?



- **RESULTS FROM JP-8+100 TEST SITES**
 - **KINGSLEY F-16A/B**
 - **LANGLEY F-15C/D**
 - **PORTLAND F-15A/B**
 - **FARGO F-16A/B**
 - **LOUISVILLE & NASHVILLE C-130**



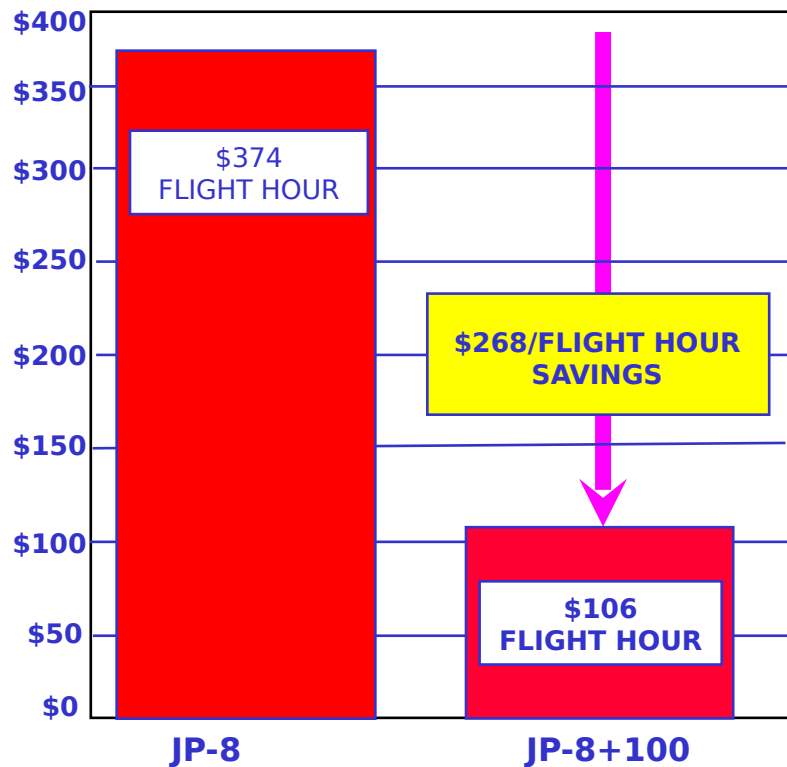
COST SAVINGS JP-8+100

KINGSLEY FIELD OREGON BASE DEMO

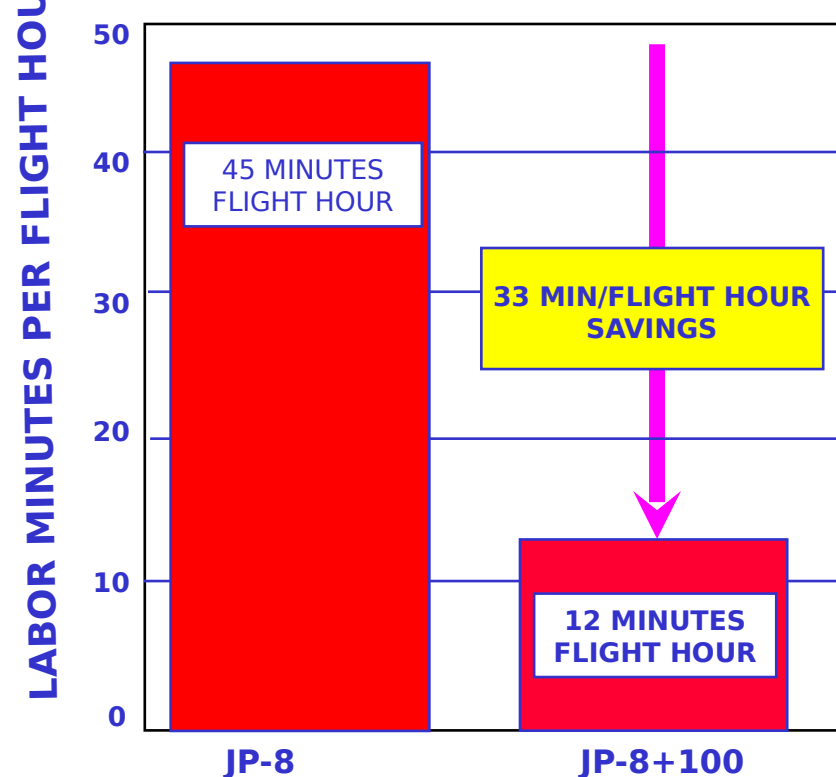
1 YEAR ANALYSIS



FUEL SYSTEM MAINTENANCE COST



FUEL SYSTEM MAINTENANCE LABOR



COST SAVINGS (NOV 1994 - NOV 1995):
\$825,000



ACC TRACKING BENEFIT @1FW LANGLEY AFB



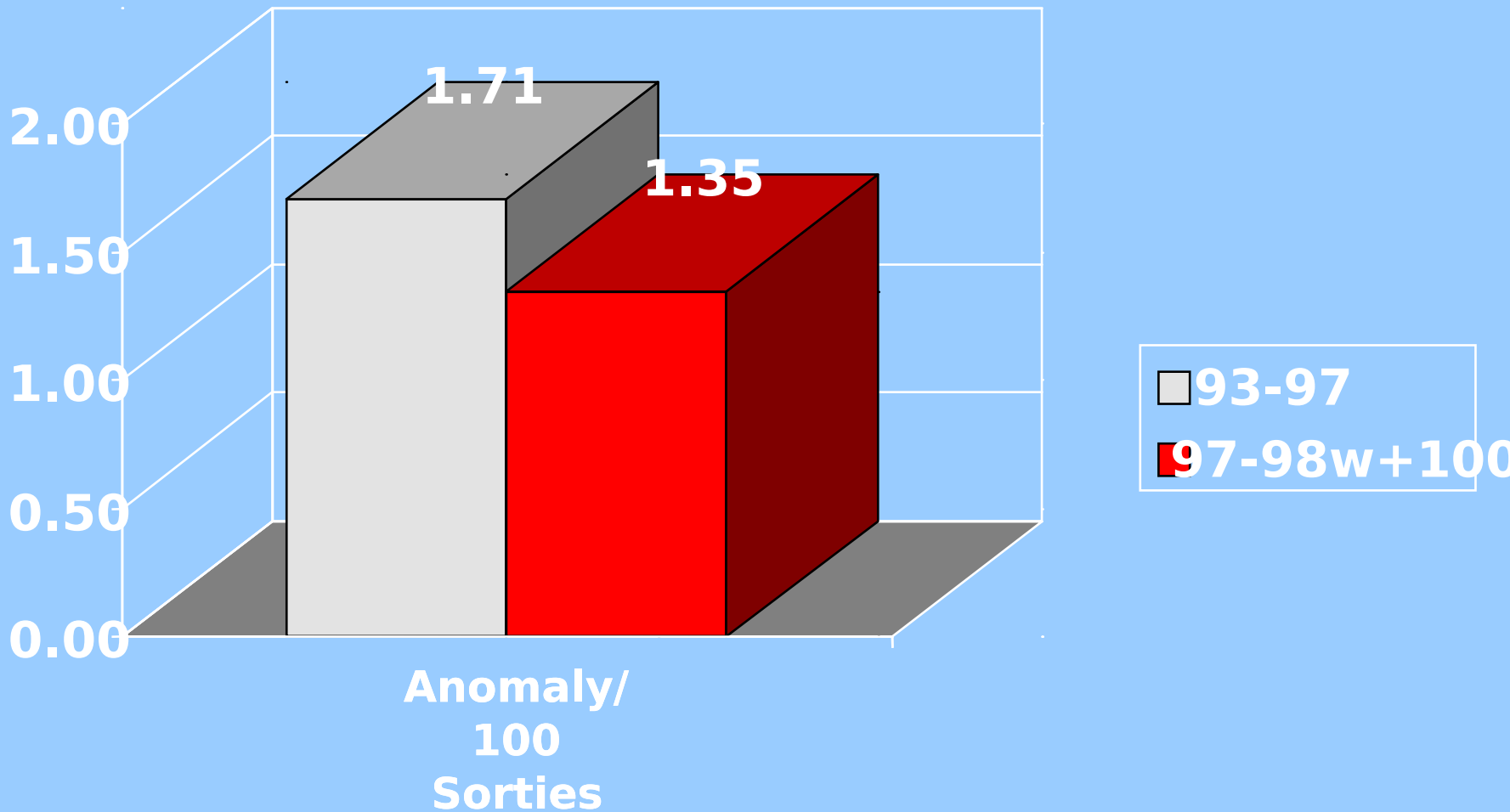
- **TRACKING BENEFITS FOR ONE YEAR (97-98)**
- **3 FIGHTER SQUADRONS**
 - **54 F-15C/Ds With F100-PW-100 Engines**
- **OLDEST FIGHTER ACFT ENGINE IN USAF**
 - **High Rate of AB Anomalies & No Diagnostics**
 - **Engine Significantly Affected By Season**



ANOMALY /100 SORTIES

1FW LANGLEY AFB

21% AVERAGE REDUCTION





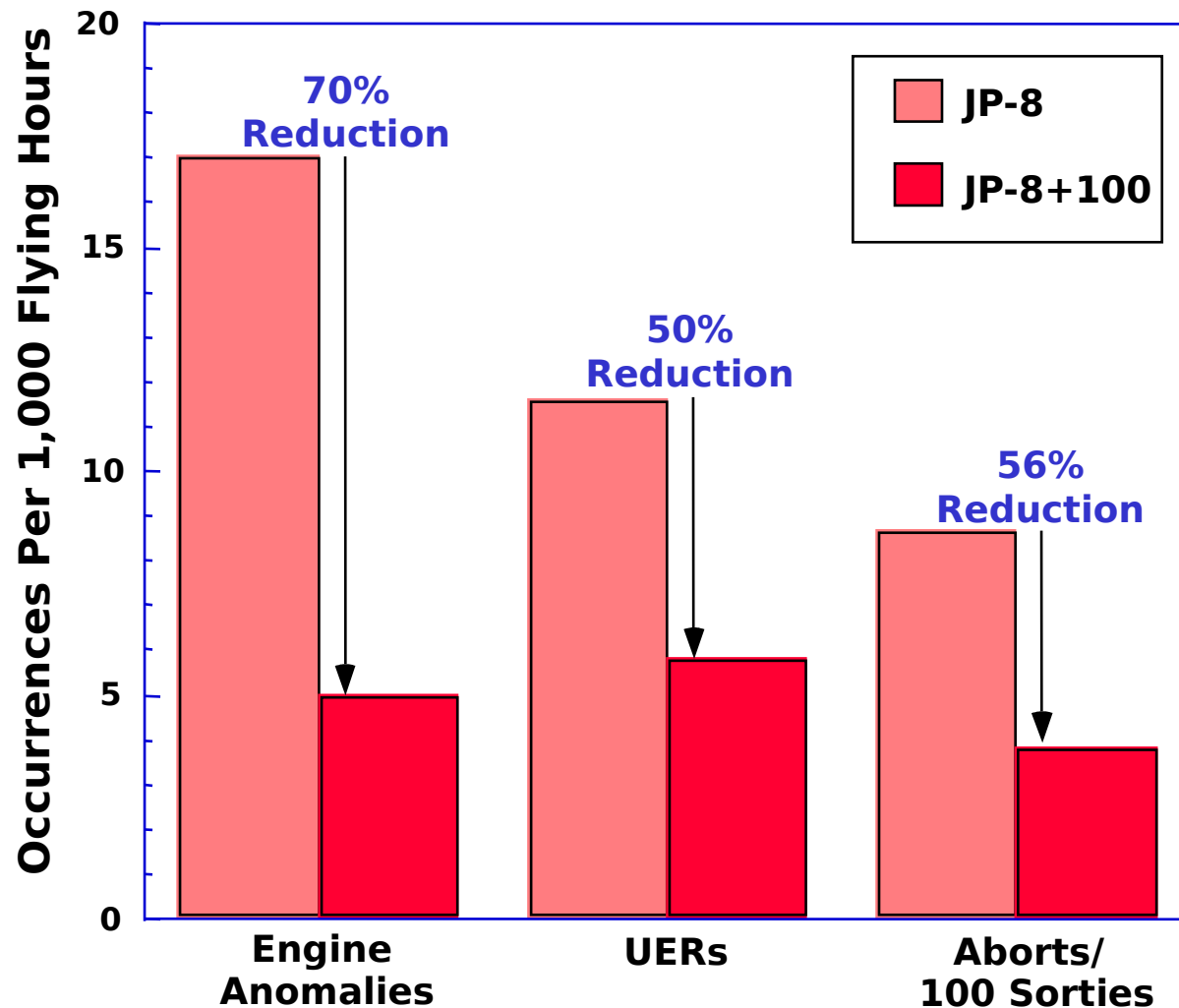
1FW LANGLEY AFB TRACKING BENEFITS



- **27% REDUCTION IN AB IFE'S**
- **48% REDUCTION IN GROUND ABORTS**
- **REDUCED PARTS CONSUMPTION**
 - **4% UFC Reduction**
 - **56% EEC Reduction**
 - **12% CENC Reduction**
- **NEGLIGIBLE REDUCTION IN UNSCHEDULED
ENGINE REMOVAL**



F-15 A/B PORTLAND ANG (142 FW)



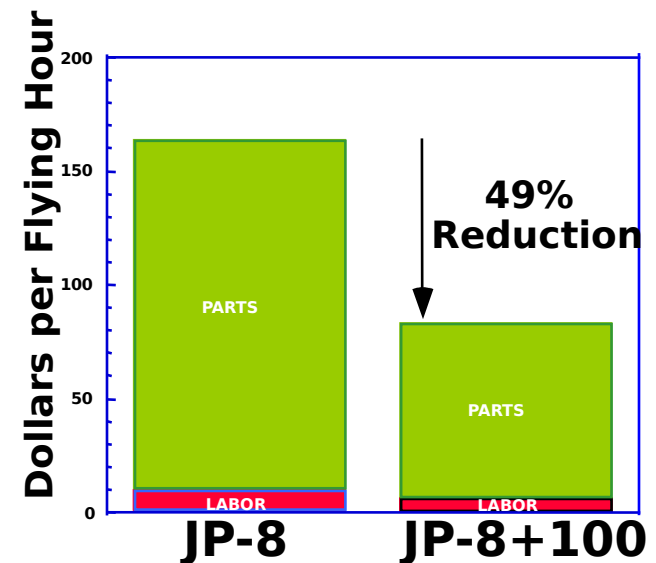
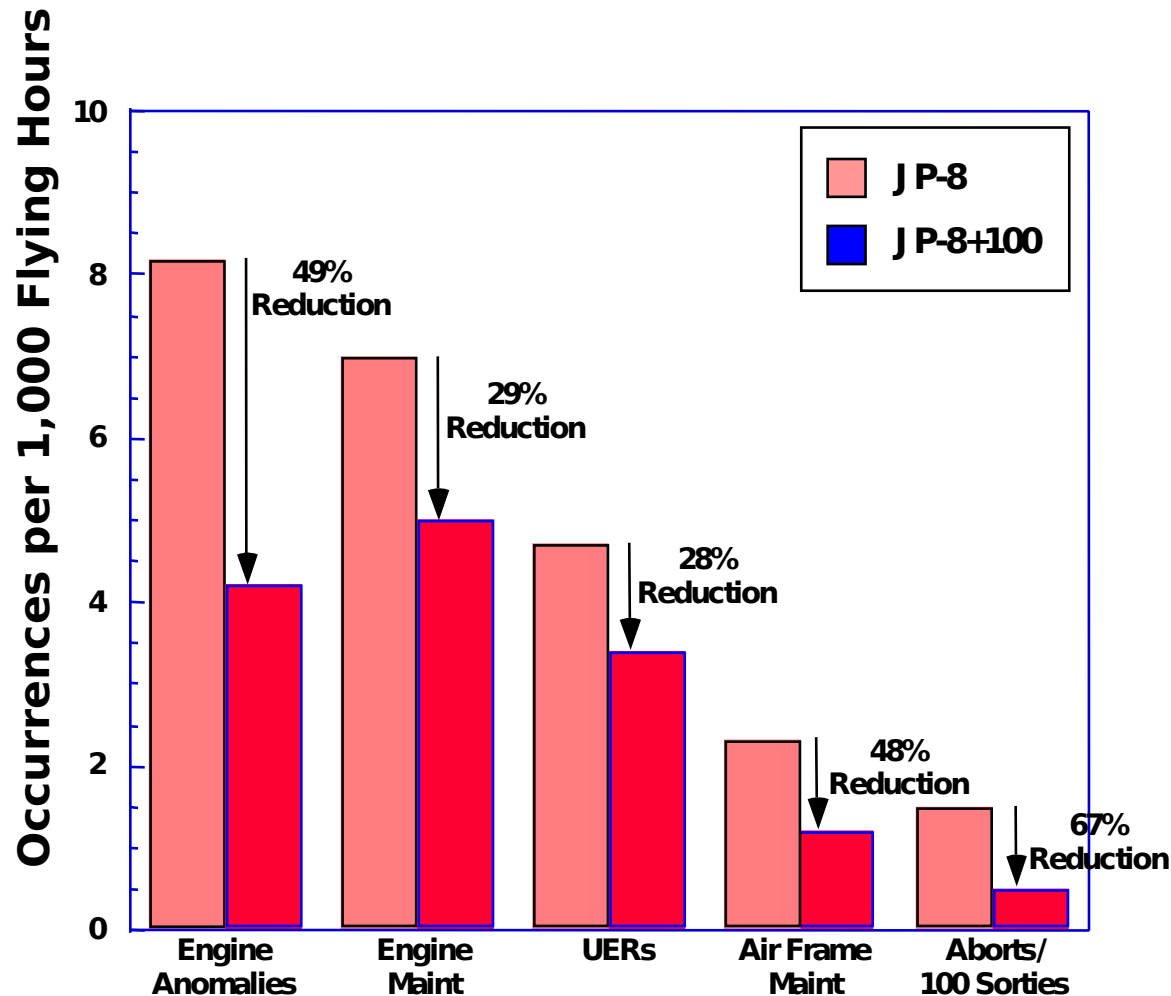
**Saves
\$180/Flying Hour**



F-16 A/B

FARGO ANG (119FW)

JP-8+100 Field Evaluation



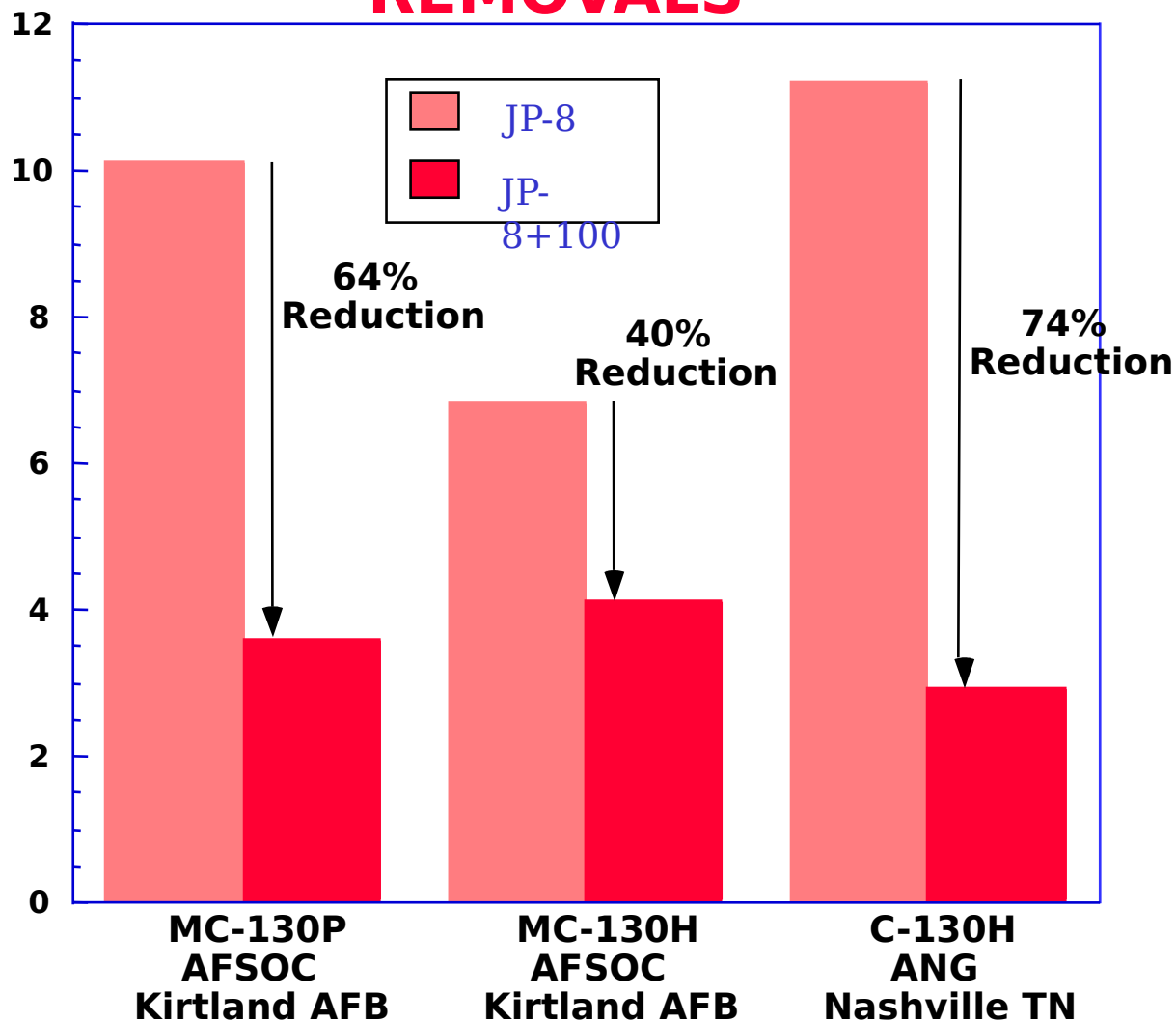
**Saves
\$80/Flying Hour**



C-130 Aircraft

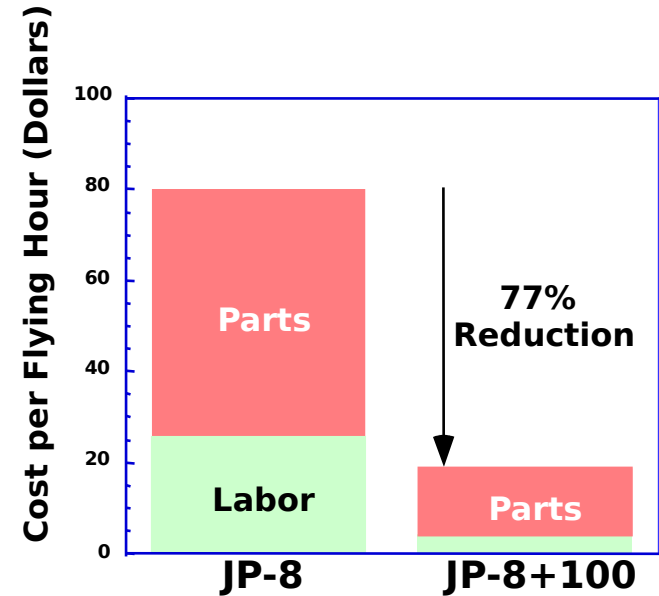
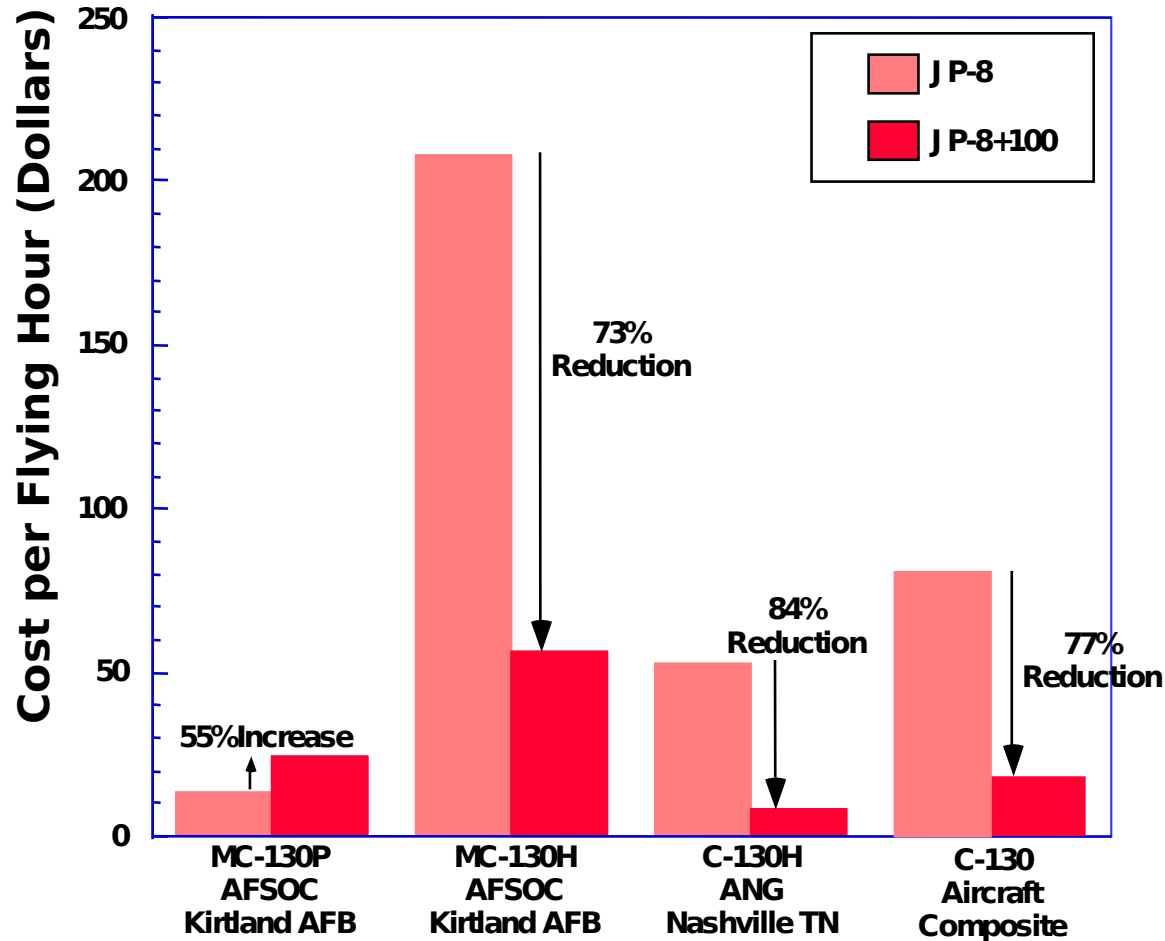
IMPACT OF JP-8+100 ON UNSCHEDULED ENGINE REMOVALS

Unscheduled Engine Removals per 1,000 Flying Hours





C-130 AIRCRAFT JP-8+100 Field Evaluations



**Saves
\$60/Flying Hour**



ANG/AFRC C-130 JP-8+100 Implementation



- **REQUESTED +100 FOR THEIR C-130S IN FY98**
- **16 ANG BASES - ANGB FUNDED \$400K**
- **INJECTORS & FILTER ELEMENTS ORDERED**
- **ANG C-130 LOCATIONS BEING IMPLEMENTED
UPON RECEIPT OF EQUIPMENT &
ADDITIVE**



WHAT ARE THE PROGRAM CHALLENGES?



- **Fuel/Water/Dirt Separation**
 - **+100 Additive Disarms**
 - Filter/Coalescers**
- **Requires Special Handling Requirements**
 - **Split Refueler Fleets**
 - Lock-out Measures
 - **Defuel Handling Precautions**
 - One Time Defuel into +100 Adapted Trucks
 - Defuel is Issued to +100 A/C, AGE, or Test Stand
 - Return to Bulk at 1:100 Ratio or Clay Filter

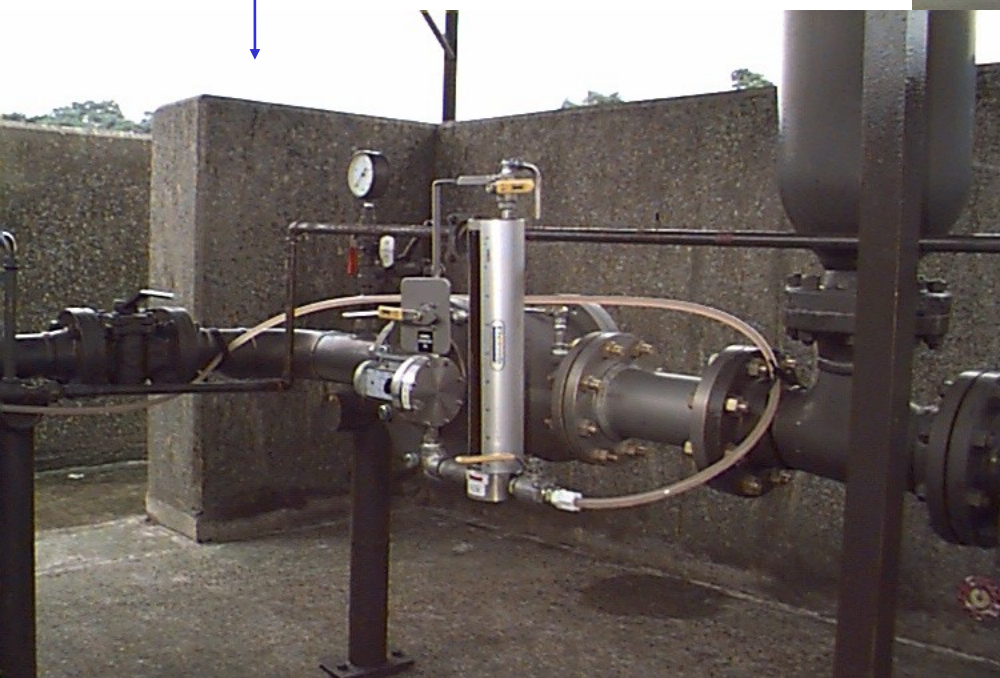


HOW IS IT IMPLEMENTED?

TYPICAL INSTALL @ LAKENHEATH



Hammond's 800 1L
Injector



400 Gal Carboy



PROGRAM FUNDING

- **SA-ALC SFT FUNDS**
 - **Injectors**
 - **Absorption Media Elements**
 - **Misc. equipment/containment/modifications**
- **DLA**
 - **Additive**
 - **.1 cent added to standard price**
- **O&M**
 - **Manhours**
 - **Filter changeouts**
 - **System modifications**



JP-8+100 TRAINING

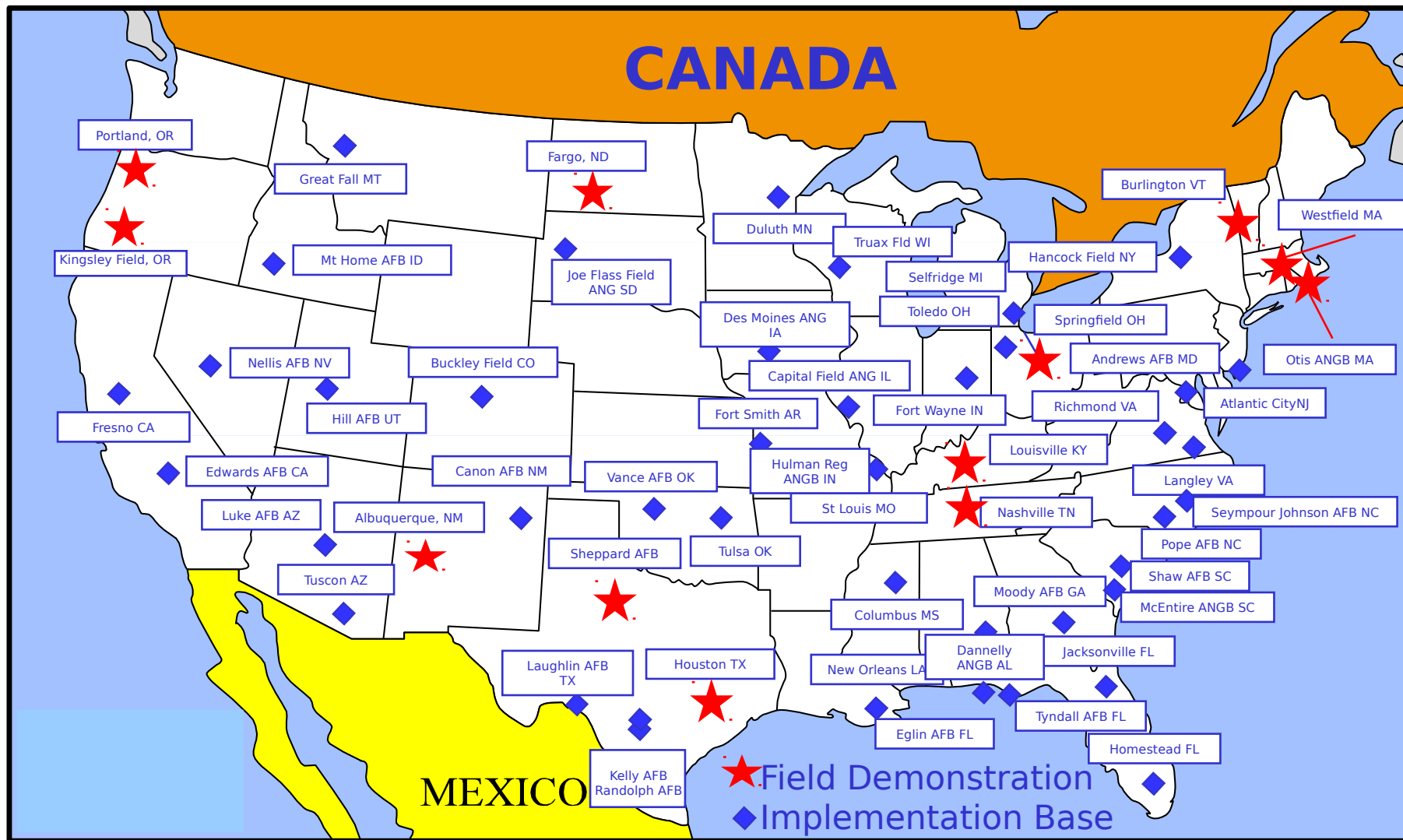


TRAINING PROVIDED TO BASES WILL INCLUDE

- JP-8+100 Development**
- Material Safety Data**
- Injection Location/Equipment Rationale**
- Management of JP-8 and JP-8+100 Resources**
- Calculating Additive Requirements**
- Injection Equipment (Installation, Calibration, Operation, Monitoring, and Maintenance)**



JP-8+100 FIELD LOCATIONS END OF 1999





SUMMARY

- **JP-8+100 WILL REDUCE THE AMOUNT OF COKING AND DEPOSITS FORMED ON ENGINE COMPONENTS**
- **ADDITIVE INJECTION IS SIMPLE & PROVEN**
- **PROGRAM CHALLENGES CAN BE OVERCOME WITH PROPER HANDLING**
- **FILTER R&D UNDERWAY**



JP-8+100 IMPLEMENTATION



QUESTIONS?

